VERIFICATION OF TRANSLATION

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declare that I am well acquainted with both the German and English languages, and that the attached is an accurate translation, to the best of my knowledge and ability, of the German language Patent Application No. 198 60 687.7, filed December 29, 1998.

I further declare that all statements made herein of my knowledge are true and that all statements made on information and belief are believed to be true; and, further, that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the above-captioned application or any trademark issued thereon.

Signature Ruth Laskowski   Date December 23, 2003
Ruth Laskowski

Machine and Process for Producing a Fibrous Material Web

The invention relates to a machine for producing a fibrous material web, in particular a tissue or hygienic paper web, with at least one nip formed between a shoe press unit and a drying cylinder, through which nip a water absorbent carrier band, a water-impermeable pressing band and the fibrous material web are guided. The invention further relates to a process for producing a fibrous material web according to the preamble of claim 28 or 29.

Several embodiments of a machine of the type mentioned at the outset are described in De-A-42 24 730. At least two nips are provided respectively in all the embodiments. The main press, which lies at the rear when viewed in the web travel direction, comprises respectively a drying cylinder and an assigned pressure element. A suction press roll or a shoe press roll can be provided as such a pressure element.

Two nips are again provided with a machine of the type mentioned at the outset known from DE-A-196-54 197. The rear main press is formed by a shoe press unit and a drying cylinder.

Two or more nips are thus always provided with the known machines. This is considered absolutely necessary here in order to achieve on the one hand a careful dewatering without crushing required in particular in the production of a tissue or hygienic paper web and, on the other hand, an improved production capacity through an increased dry matter content after the press. A careful dewatering of the web without crushing is thereby achieved with the complete or partial replacement of the nip presses by shoe presses as a result of the corresponding nip elongation or increase of the pressing time.

However, a major disadvantage of these known embodiments now lies in the relatively high investment and operating costs compared with the improvements achieved. In view of the hitherto customary restriction of the maximum linear load to a value in the region of 90 kN, e.g., for Yankee cylinders, it was always necessary to provide at least two nips with the known press designs.

The object of the invention is to create a machine and a process of the type mentioned at the outset with which the highest possible dry matter content and/or specific volume can be achieved while avoiding the above-mentioned disadvantages and while largely retaining the quality features required for the produced web,.

This object is attained according to the invention with regard to the machine in that at least one nip formed between a shoe press unit and the drying cylinder is provided, the length of which viewed in the web travel direction is smaller than or equal to a value of approx. 60 mm and the pressure profile of which resulting over the nip length has a maximum pressing pressure that is greater than or equal to a value of approx. 3.3 MPa.

A substantial increase in both the dry matter content and the specific volume of the fibrous material web is achieved quite unexpectedly with such an embodiment. This is all the more surprising since the proposed solution departs from the course hitherto taken in press development, the goal of which lay in effecting a careful, slow dewatering as a prerequisite for ideal results by replacing the nip presses with shoe presses with elongated nip. On the basis of the embodiment according to the invention, it is now possible to realize, e.g., many tissue paper machines with only a single shoe nip.

In a preferred practical embodiment of the machine according to the invention, the nip length is smaller than or equal to a value of approx. 50 mm and the maximum pressing pressure is greater than or equal to a value of approx. 4.3 MPa. The nip length is defined as length in contact between drying cylinder and assigned pressure element and new carrier band running through.

The specific volume is thereby likewise slightly increased. Such an increase can be, e.g., approx. 5%. A substantial increase occurs only with respect to the dry matter content, which applies in particular in comparison with a nip that is formed by means of a suction press roll or by a shoe press with a nip length of, e.g., 120 mm. In this case, for example, an increase in the dry matter content of approx. 2.5 to 3% is possible, if a constant linear

load of approx. 90 kN/m is assumed. Such a value must not be exceeded with the hitherto customary Yankee cylinders in view of a maximum permissible mechanical stress. The invention can therefore also be used in particular with conversions of existing presses with particular advantage. Thus increases in the dry matter content and constant or even higher values of the specific volume (bulk) can be achieved compared with the conventional presses despite a respective linear load restriction.

In a further expedient embodiment the nip length is in a region of approx. 37 mm and the maximum pressing pressure in a region of approx. 4.8 MPa.

According to an alternative embodiment of the machine according to the invention, the previously mentioned object is attained in that at least one nip formed between a shoe press unit and the drying cylinder is provided, the length of which nip viewed in the web travel direction is greater than a value of approx. 80 mm and the pressure profile of which resulting over the nip length features a maximum pressing pressure that is smaller than or equal to a value of approx. 2 MPa.

In particular in this case it is advantageous if the dwell time of the fibrous material web in the nip is greater than or equal to a value of, e.g., approx. 3.5 ms and in particular greater than or equal to 4 ms. The dwell time can thereby be defined in particular by the ratio of nip length or shoe length to the web speed.

The maximum linear load produced by the nip can be, e.g., in a region of approx. 90 to approx. 120 kN/m.

In an expedient practical embodiment of the machine according to the invention, the shoe press unit comprises a press shoe that can be pressed against the drying cylinder via several pressure units arranged next to one another crosswise to the web travel direction. A respectively desired pressure force cross profile can be set to homogenize the web properties particularly at the web edges.

In particular a crepe cylinder, i.e., a so-called Yankee cylinder, can be provided as a drying cylinder.

The pressure profile resulting over the nip length is preferably asymmetrical.

If the nip length is smaller than or equal to a value of approx. 60 mm and the pressure profile features a maximum pressing pressure that is greater than or equal to a value of approx. 3.3 MPa, the maximum pressing pressure is expediently in the rear half of the nip length viewed in the web travel direction.

However, if the nip length is greater than a value of approx. 80 mm and if the pressure profile features a maximum pressing pressure that is smaller than or equal to a value of approx. 2 MPa, the maximum pressing pressure can be in particular in the rear quarter of the nip length viewed in the web travel direction.

In particular with a nip length that is smaller than or equal to approx. 60 mm, it is advantageous if the average pressure increase gradient in the section of the pressure profile extending from the start of the nip to the maximum pressing pressure with a new-value carrier band is greater than or equal to a value of approx. 40 kPa/mm, in particular greater than or equal to approx. 60 kPa/mm and preferably greater than or equal to approx. 120 kPa/mm.

The average pressure drop gradient in the end region of the pressure profile with a new-value carrier band is preferably greater than or equal to a value of approx. 300 kPa/mm, in particular greater than or equal to approx. 500 kPa/mm and preferably greater than or equal to approx. 800 kPa/mm. The average pressure drop gradient in the end region increases with increasing operating time of the felt. Values of over 1000 to over 1600 kPa/mm are thus achieved with a nip according to the invention.

In a preferred practical embodiment the water absorbent carrier band lies in the nip between the water-impermeable pressing band and the fibrous material web, whereby the fibrous material web touches the drying cylinder.

In particular a felt can be provided as a water absorbent carrier band. Such a felt can have, e.g., a basis weight that is smaller than or equal to a value of approx. 1450 g/m^2. For example, a felt that is structured in a particular way in the manner of an imprinting wire or felt provided with protuberances, i.e., of a so-called "imprinting fabric" or "imprinting felt" (cf., e.g., WO98/00604) or of a "patterning fabric" or "patterning felt" featuring a coarsely structured surface can be used. The special carrier bands have an advantageous effect on the specific volume of the produced paper web in particular in combination with a nip according to the invention with a nip length greater than or equal to approx. 80 mm.

The water absorbent carrier band can have a different composition in the thickness direction. The side of the carrier band facing the fibrous material web can thus have, e.g., a finer structure than the side facing away from the fibrous material web.

In an expedient practical embodiment the pressing band has a grooved surface and/or a blind bored surface, such as that described, e.g., in DE-A-196 54 198.

In principle another nip can also be formed at the drying cylinder. In certain cases it can thereby be expedient for at least two nips formed by means of a respective shoe press unit to be provided at the drying cylinder. In principle it is also conceivable to provide an additional nip ahead of the drying cylinder in the web travel direction.

In an expedient practical embodiment of the machine according to the invention, the carrier band and the fibrous material web are guided over at least one suction device ahead of the drying cylinder in the web travel direction, through which suction device a corresponding pre-dewatering then takes place. At least one suction device or suction

box can thereby expediently be provided, which suction device comprises a suction roll and/or a suction shoe.

In a preferred practical embodiment of the machine according to the invention, a shoe press roll is provided as a shoe press unit.

Moreover, it is advantageous if the shoe press unit comprises at least one replaceable press shoe.

The process according to the invention of the type disclosed in the preamble of claim 28 is characterized in that the fibrous material web to be dewatered is subjected in the nip to a maximum pressing pressure of the pressure distribution curve of at least 3.3 MPa for a duration of a maximum of 3ms. The duration or dwell time of the fibrous material web in the nip is thereby defined by the ratio between the nip length and the web speed.

In an alternative embodiment variant of the process according to the invention of the type set forth in the preamble of claim 29, the fibrous material web to be dewatered is subjected in the nip to a pressing pressure of a maximum of 2 MPa for a duration of at least 3.5 ms.

The invention can be used, e.g., for a crescent former, a fourdrinier wire tissue paper machine, a twin-wire former, a suction breast roll machine, etc.

The stock input for producing, e.g., a tissue web can comprise, e.g., refined pulp. Here the nip according to the invention can be used with particular advantage to increase the dry matter content.

However, such an stock input used, e.g., to produce a tissue web can also comprise unrefined pulp. In this case the long nip according to the invention can be used with particular advantage to increase the specific volume.

The invention can also be used for so-called “curled fibers.” In this case the stock suspension contains a proportion of fibers that have been subjected to a special treatment. The cellulose fibers, which are essentially straight or curled in a plane, are thereby curled so that a spatial fiber shape forms, e.g., in the manner of a helix.

The invention can also be used in particular in a tissue paper machine with at least one so-called “through air drying” process, whereby the nip according to the invention is used in particular ahead of a corresponding “through air drying” device. A combination of this type is advantageous in particular in view of a high dry matter content and a high specific volume. Through the nip according to the invention on the one hand a high dry matter content is thus achieved, through which the operating costs of the energy-intensive drying phase are reduced. On the other hand the web is at most slightly condensed, which means that the specific volume of the web is increased or remains unimpaired at higher pressing pressures, through which in particular the “through air drying” process also becomes more efficient and more economical.

The invention can also be used in particular in the production of multiple-layer webs using a single headbox or the production of multiple-ply webs using several headboxes.

The invention is described in more detail below on the basis of exemplary embodiments with reference to the drawing, this shows:

Fig. 1 A purely diagrammatic partial illustration of a shoe press according to the invention with a nip formed between a shoe press unit and a drying cylinder,

Fig. 2 The pressing pressure distribution of a conventional shoe press,

Fig. 3 The pressing pressure distribution of an exemplary embodiment of the shoe press according to the invention with relatively short press shoe,

Fig. 4 A comparison of the pressing pressure distribution of an exemplary embodiment of the shoe press according to the invention with relatively short press shoe with the pressing pressure distribution of a conventional press provided with a suction press roll,

Fig. 5 A comparison of the pressing pressure distribution of an exemplary embodiment of the shoe press according to the invention with relatively long press shoe with the pressing pressure distribution of a conventional press provided with a suction press roll,

Fig. 6 The specific volume compared with the dry matter content, whereby the results obtained for an exemplary embodiment of the shoe press according to the invention with relatively short press shoe are compared with those for a conventional press provided with a suction press roll, and

Fig. 7 The specific volume compared with the dry matter content, whereby the results obtained for an exemplary embodiment of the shoe press according to the invention with relatively long press shoe are compared with those for a conventional press provided with a suction press roll.

Fig. 1 shows in a purely diagrammatic partial illustration an exemplary embodiment of a shoe press 10 according to the invention, which shoe press can be used, e.g., in a machine for producing a fibrous material web such as in particular a tissue or hygienic paper web.

The nip 12 of this shoe press 10 is formed between a shoe press unit, in the present case a shoe press roll 14, and a drying cylinder 16, through which apart from the fibrous material web a water-absorbent carrier band 18 and a water-impermeable pressing band is guided, which in the present case is the press jacket 20 of the shoe press roll 14. The water absorbent carrier band 18 can be formed in particular by a felt. In the present case, the water absorbent carrier band 18 is guided between the press jacket 20 and the fibrous

material web through the nip 12, whereby the fibrous material web touches the drying cylinder 16.

As can be seen from Fig. 1, the shoe press roll 14 has a two-part press shoe 22, between the two parts of which a thermal insulating layer 24 is inserted.

The press shoe 22 can be pressable against the drying cylinder 16 via several pressure elements 26 arranged next to one another crosswise to the web travel direction 1.

The drying cylinder 16 can be, e.g., a Yankee cylinder.

The water absorbent carrier band 18 formed, e.g., by a felt, can feature a different composition in the thickness direction. For example, the side of the carrier band 18 facing the fibrous material web can thereby have a finer structure than that of the side facing away from the fibrous material web. The press jacket 20 can have a smooth surface, a grooved surface, or a blind bored surface. At least one further nip (not shown here) can be formed at the drying cylinder 16. An additional nip can be provided ahead of the drying cylinder 16 in the web travel direction l. In principle, the carrier band 18 and the fibrous material web can also be guided over at least one suction device ahead of the drying cylinder 16 in the web travel direction 1.

The shoe press unit 14 can comprise at least one replaceable press shoe 22.

Fig. 2 shows the pressure profile or the pressing pressure distribution p(L) of a conventional shoe press. The pressing pressure p is thereby plotted over the length L of the nip 12 or the press shoe 22.

In a conventional long nip of this type a very gentle pressure increase first occurs up to a relatively low maximum pressing pressure p_{max}. Following the maximum pressing pressure p_{max} of this pressure distribution p(L), a rapid drop in pressure then occurs.

The shoe press 10 according to the invention can now be designed in particular so that the length L of the nip 12 (cf. Fig. 1) seen in the web travel direction 1 is smaller than or equal to a value of approx. 60 mm and its pressure profile p(L) resulting over the nip length L has a maximum pressing pressure p_{max} that is greater than or equal to a value of approx. 3.3. MPa.

Fig. 3 shows the pressing pressure distribution p(L) of an exemplary embodiment of such a shoe press 10 according to the invention with relatively short press shoe 22. Starting from the beginning of the nip first of all an extreme rise in the pressing pressure up to a relatively high maximum pressing pressure p_{max} thereby occurs. Following this maximum pressing pressure p_{max} the pressing pressure then drops very quickly in the end area.

Moreover, it can be seen from Fig. 3 that the pressure profile p(L) resulting over the nip length L is asymmetrical. The maximum pressing pressure p_{max} thereby lies in the rear half of the nip length L viewed in the web travel direction 1.

Fig. 4 shows a comparison of the pressing pressure distribution $p_{10}(L)$ of an exemplary embodiment of the shoe press 10 according to the invention with relatively short press shoe 12 with the pressing pressure distribution $p_s(L)$ of a conventional press provided with a suction press roll. Compared with the conventional press, in particular a shorter nip results as well as a higher maximum pressing pressure p_{max}. In the present case the maximum linear load produced in the nip was respectively 90 kN/m.

In an alternative embodiment variant of the shoe press 14 according to the invention, the length L of the nip 12 (cf. Fig. 1) viewed in the web travel direction 1 can be greater than a value of approx. 80 mm and its pressure profile p_L resulting over the nip length L can feature a maximum pressing pressure p_{max} that is smaller than or equal to a value of, e.g., approx. 2 MPa. The maximum linear load produced in the nip can thereby be in particular in a region of approx. 90 to approx. 110 kN/m. With higher maximum linear loads, such as are normally no longer possible with the customary, not additionally

reinforced Yankee cylinders (cf., e.g., the high value of 270 kN/m still given in Fig. 5) a higher maximum pressing pressure p_{max} is also conceivable.

Fig. 5 shows a comparison of the pressing pressure distribution $p_{10}(L)$ of an exemplary embodiment of such a shoe press 10 according to the invention with relatively long press shoe 12 with the pressing pressure distribution p_s of a conventional press provided with a suction press roll.

Whereas the pressing pressure distribution $p_{10}(L)$ of the shoe press according to the invention is shown for a maximum linear load of 90 kN/m as well as for a higher maximum linear load of 270 kN/m, the pressing pressure distribution $p_s(L)$ of the conventional press is shown only for a maximum linear load of 90 kN/m.

According to this Fig. 5, a much longer nip 12 results with the shoe press according to the invention. Moreover, the corresponding pressing pressure distribution $p_{10}(L)$ has a much lower maximum pressing pressure p_{max} (cf. the shaded lower pressing pressure distribution $p_{10}(L)$ given for a maximum linear load of 90 kN/m). In addition, it can be seen from Fig. 5 that even with a substantially higher maximum linear load of here 270 kN/m the maximum pressing pressure p_{max} is not higher than the maximum pressing pressure p_{max} of the conventional press, for which a maximum linear load of 90 kN/m is given in the present case.

Fig. 6 shows the specific volume compared with the dry matter content whereby the results obtained for an exemplary embodiment of the shoe press 10 according to the invention with relatively short press shoe 22 are again compared to the results V_S for a conventional press provided with suction press roll. If in both cases a constant maximum linear load of 90 kN/m is first assumed, compared with the conventional press, e.g., an increase in the dry matter content by 2.5% and an increase of the specific volume by 5% can be achieved. With a higher maximum linear load of, e.g., 270 kN/m, e.g., a further increase of the dry matter content by 4.5% can be achieved, thus overall 2.5% + 4.5% =

7% more than with the conventional suction press roll, whereby in this case only 10% in specific volume has to be tolerated.

Fig. 7 shows the specific volume compared with the dry matter content, whereby the results V_{10} obtained for an exemplary embodiment of the shoe press 10 according to the invention with relatively long press shoe 12 are again compared to the results V_S for a conventional press provided with a suction press roll.

If a constant maximum linear load of 90 kN/m is assumed, with the same dry matter content an increase in the specific volume of 20% can be obtained, through which a correspondingly high quality results. However, with the same specific volume an increase in the dry matter content of 4% can be achieved, through which energy is saved or a higher production rate is achieved. As can be seen from Fig. 7, here a constant maximum linear load of 270 kN/m is assumed.

List of Reference Numbers

10	Shoe press
12	Nip
14	Shoe press roll
16	Drying cylinder
18	Carrier band
20	Pressing band, press jacket
22	Press shoe
24	Thermal insulating layer
26	Pressure element
L	Nip length
l	Web travel direction
p(L)	Pressing pressure distribution, pressure profile
p_{max}	Maximum pressing pressure

Claims

1. Machine for producing a fibrous material web, in particular a tissue or hygienic paper web, with at least one nip (12) formed between a shoe press unit (14) and a drying cylinder (16), through which nip a water absorbent carrier band (18), a water-impermeable pressing band (20) and the fibrous material web are guided, characterized in that at least one nip (12) is provided between a shoe press unit (14) and the drying cylinder (16), the length (L) of which nip viewed in the web travel direction (1) is smaller than or equal to a value of approx. 60 mm and the pressure profile (p(L)) of which resulting over the nip length (L) features a maximum pressing pressure (p_{max}) that is greater than or equal to a value of approx. 3.3 MPa.
2. Machine according to claim 1, characterized in that the nip length (L) is smaller than or equal to a value of approx. 50 mm and the maximum pressing pressure (p_{max}) is greater than or equal to a value of approx. 4.3 MPa.
3. Machine according to claim 2, characterized in that the nip length (L) lies in a region of approx. 37 mm and the maximum pressing pressure (p_{max}) lies in a region of approx. 4.8 MPa.
4. Machine for producing a fibrous material web, in particular a tissue or hygienic paper web, with at least one nip (12) formed between a shoe press unit (14) and a drying cylinder (16), through which nip a water absorbent carrier band (18), a water-impermeable pressing band (20) and the fibrous material web are guided, characterized in that at least one nip (12) formed between a shoe press unit (14) and the drying cylinder (16) is provided, the length (L) of which nip viewed in the web travel direction (1) is greater than a value of approx. 80 mm and the pressure profile (p(L)) of which resulting over the nip length (L) features a maximum pressing pressure (p_{max}) that is smaller than or equal to a value of approx. 2 MPa.
5. Machine according to one of the preceding claims, characterized in that the maximum linear load produced in the nip (12) lies in a region of approx. 90 to approx. 110 kN/m.
6. Machine according to one of the preceding claims, characterized in that the shoe press unit (14) comprises a press shoe (22) that is pressable against the drying cylinder via

several pressure elements (26) that are arranged next to one another crosswise to the web travel direction (l) and that can preferably be activated independently of one another.

7. Machine according to one of the preceding claims, characterized in that a Yankee cylinder is provided as drying cylinder (16).
8. Machine according to one of the preceding claims, characterized in that the pressure profile (p(L) resulting over the nip length (L) is asymmetrical.
9. Machine according to one of the preceding claims, characterized in that the nip length (L) is smaller than or equal to a value of approx. 60 mm and the pressure profile (p(L) features a maximum pressing pressure (p_{max}) that is greater than or equal to a value of approx. 3.3 MPa and that the maximum pressing pressure (p_{max}) lies in the rear half of the nip length (L) viewed in the web travel direction.
10. Machine according to one of claims 1 through 8, characterized in that the nip length (L) is greater than a value of approx. 80 mm and the pressure profile (p(L) features a maximum pressing pressure (p_{max}) that is smaller than or equal to a value of approx. 2 MPa and that the maximum pressing pressure (p_{max}) lies in the rear quarter of the nip length (L) viewed in the web travel direction (1).
11. Machine according to one of the preceding claims, characterized in that the average pressure increase gradient in the section of the pressure profile (p(L) extending from the start of the nip to the maximum pressing pressure (p_{max}) with a new-value carrier band is greater than or equal to a value of approx. 40 kPa/mm, in particular greater than or equal to approx. 60 kPa/mm and preferably greater than or equal to approx. 120 kPa/mm.
12. Machine according to one of the preceding claims, characterized in that the average pressure drop gradient in the end area of the pressure profile (p(L)) with a new-value carrier band is greater than or equal to a value of approx. 300 kPa/mm, in particular greater than or equal to approx. 500 kPa/mm, expediently greater than or equal to approx. 800 kPa/mm and preferably greater than or equal to approx. 960 kPa/mm.
13. Machine according to one of the preceding claims, characterized in that the water absorbent carrier band (18) in the nip (12) lies between the water-impermeable

pressing band (20) and the fibrous material web and the fibrous material web touches the drying cylinder (16).

14. Machine according to one of the preceding claims, characterized in that a felt is provided as a water absorbent carrier band (18).
15. Machine according to one of the preceding claims, characterized in that the water absorbent carrier band (18) features a different composition in the thickness direction.
16. Machine according to claim 15, characterized in that the side of the carrier band (18) facing the fibrous material web has a finer structure than the side facing away from the fibrous material web.
17. Machine according to one of the preceding claims, characterized in that the pressing band (20) has a smooth surface, a grooved surface and/or a blind bored surface.
18. Machine according to one of the preceding claims, characterized in that at least one other nip (12) is formed at the drying cylinder (16).
19. Machine according to claim 18, characterized in that at least two nips (12) formed by means of a respective shoe press unit (14) are provided at the drying cylinder (16).
20. Machine according to one of the preceding claims, characterized in that an additional nip (12) is provided ahead of the drying cylinder (16) in the web travel direction (l).
21. Machine according to one of the preceding claims, characterized in that the carrier band (18) and the fibrous material web are guided over at least one suction device ahead of the drying cylinder (16) in the web travel direction (1).
22. Machine according to claim 21, characterized in that at least one suction device is provided that comprises a suction roll and/or a suction shoe.
23. Machine according to one of the preceding claims, characterized in that a shoe press roll (14) is provided as a shoe press unit.
24. Machine according to claim 23, characterized in that the pressing band is formed by the press jacket (20) of the shoe press roll (14).
25. Machine according to one of the preceding claims, characterized in that the shoe press unit (14) comprises at least one replaceable press shoe (22).
26. Machine according to one of the preceding claims, characterized in that a structured felt in the manner of an imprinting wire or felt provided with protuberances, i.e., of a so-called “imprinting fabric” or “imprinting felt” or of a “patterning fabric” or

"patterning felt" featuring a coarsely structured surface is provided as the carrier band (18).

27. Use of the machine according to one of the preceding claims for producing a fibrous material web using so-called "curled fibers."
28. Process for producing a fibrous material web, in particular a tissue or hygienic paper web, in which the fibrous material web to be dewatered is guided through a nip (12) together with a carrier band (18), characterized in that the fibrous material web to be dewatered is subjected in the nip (12) to a pressing pressure of at least 3.3 MPa for a duration of a maximum of 3 ms.
29. Process for producing a fibrous material web, in particular a tissue or hygienic paper web in which the fibrous material web to be dewatered is guided through a nip (12) together with a band (18), characterized in that the fibrous material web to be dewatered is subjected in the nip (12) to a pressing pressure of a maximum of 2 MPa for a duration of at least 3.5 ms.
30. Process according to one of the previous claims, characterized by the use of so-called "curled fibers."

Abstract

A machine for producing a fibrous material web, such as in particular a tissue or hygienic paper web, comprises at least one nip formed between a shoe press unit 14 and a drying cylinder 16, through which nip a water absorbent carrier band 18, a water-impermeable pressing band 20 and the fibrous material web are guided. Thereby at least one nip 12 formed between a shoe press unit 14 and the drying cylinder 16 is provided, the length L of which viewed in the web travel direction 1 is smaller than or equal to a value of approx. 60 mm and the pressure profile of which resulting over the nip length L features a maximum pressing pressure that is greater than or equal to a value of approx. 3.3 MPa. Alternatively, the nip length can be greater than a value of approx. 80 mm, whereby in this case the maximum pressing pressure is smaller than or equal to a value of approx. 2 MPa.

(Fig. 1)

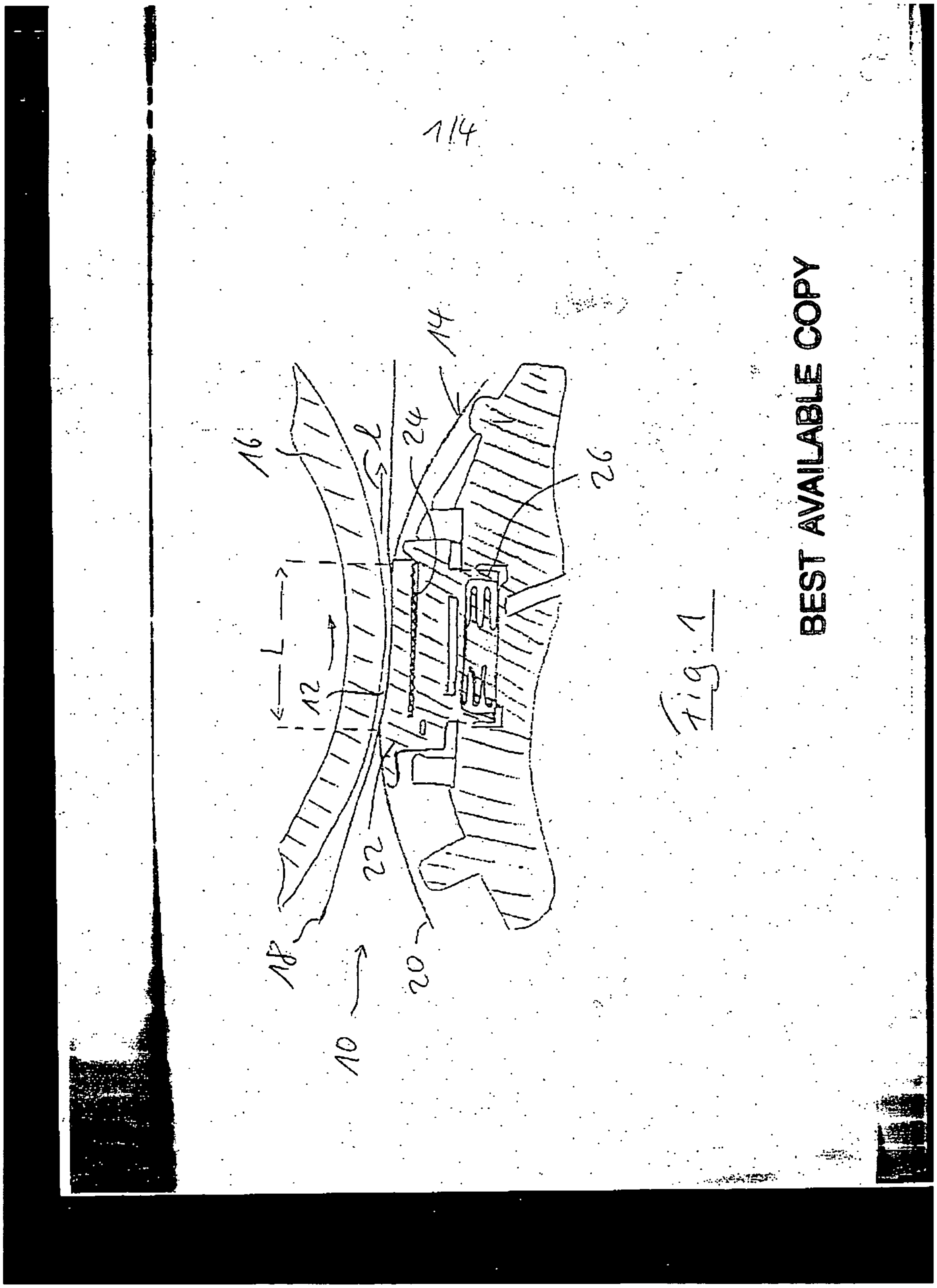

Fig. 1

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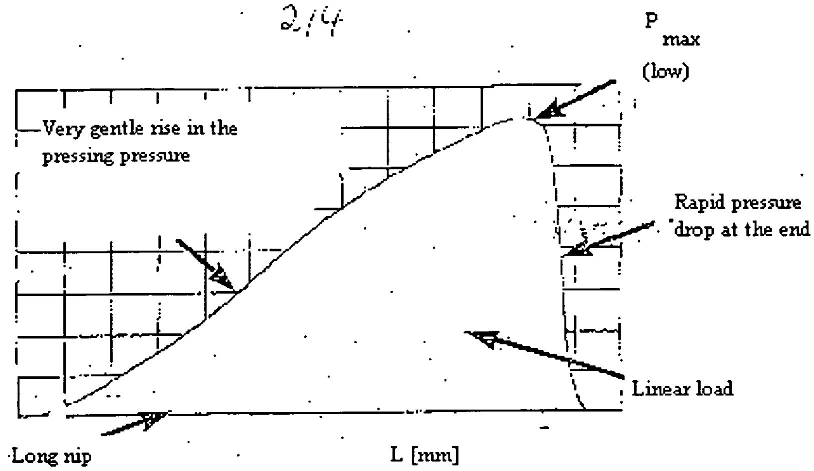

Fig. 2

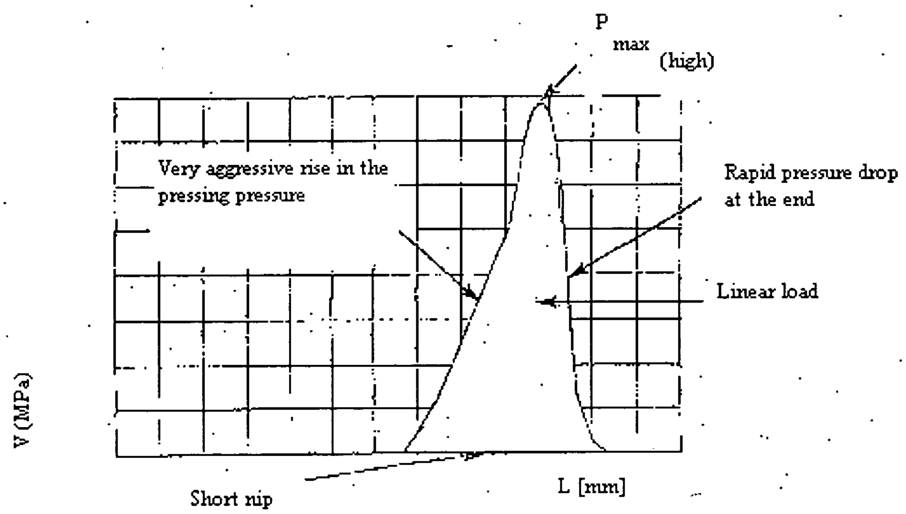

Fig. 3

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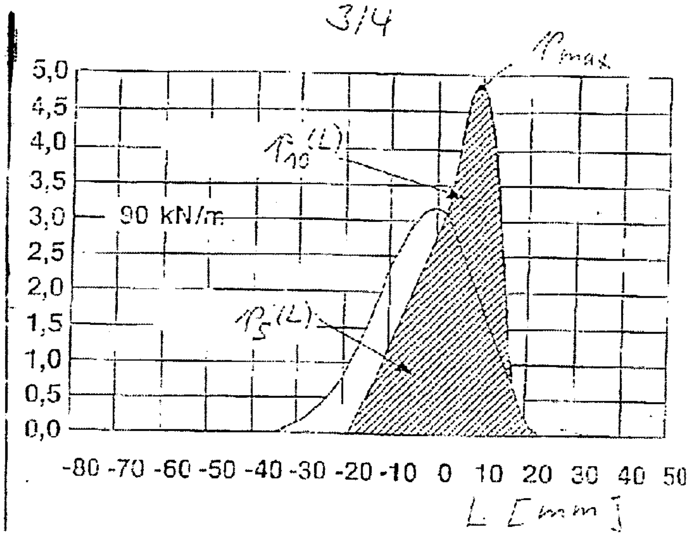
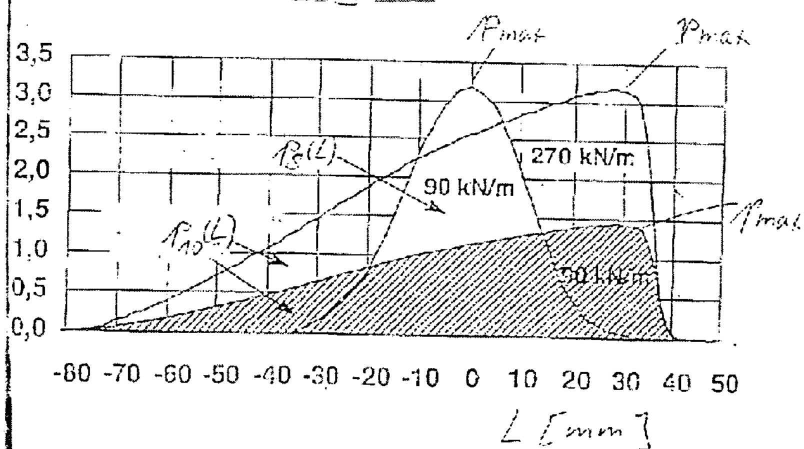


5,0
4,5
4,0
3,5
3,0
2,5
2,0
1,5
1,0
0,5
0,0
90 kN/m
P_{max}
$P_{10}(L)$
$P_5(L)$
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50
L [mm]

Fig. 4



3,5
3,0
2,5
2,0
1,5
1,0
0,5
0,0
P_{max}
P_{max}
P_{max}
270 kN/m
90 kN/m
$P_5(L)$
$P_{10}(L)$
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50
L [mm]

Fig. 5

4/4

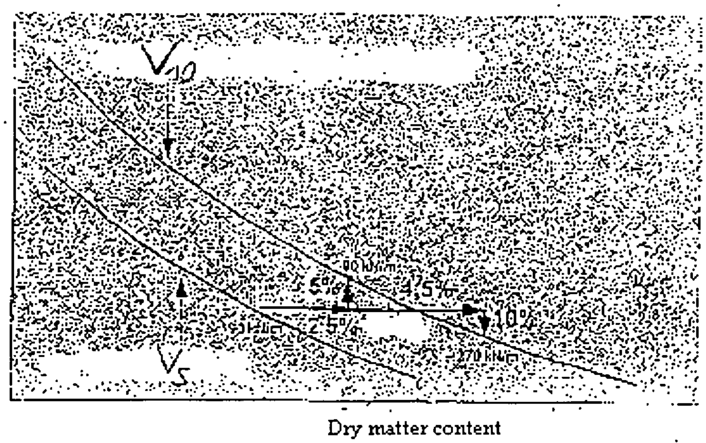

V10
V5
Dry matter content

Fig. 6

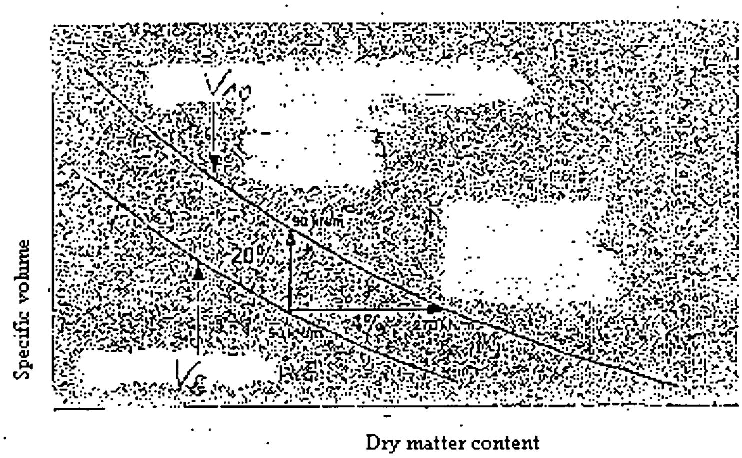

V10
V5
90 kN/m
20%
Specific volume
Dry matter content

Fig. 7